



Isolated, Field Configurable Analog Input

6B21

FEATURES

- Module accepts commands from the host computer and converts it into an isolated process current suitable for interfacing with valves and actuators.
- Complete microcomputer-based data acquisition systems.
- Output range can be selected to either a 0 to 20 mA or 4 mA to 20 mA process current.

APPLICATIONS

- Process Monitoring & Control
- Test Stand Automation
- Machine Monitoring
- Material Testing
- Remote Energy Mangement
- Laboratory Data Acquisition

PRODUCT OVERVIEW

The 6B Series delivers sensor-to-host signal-conditioning for remote applications. Software-configurable for a wide variety of sensor types, including: analog input, analog output, and digital I/O, the 6B Series is intended for remote data acquisition, machine monitoring, remote energy management and process monitoring and control applications.

Including transformer-based isolation, ranging, linearization, A/d conversion and RS-232C/RS-485 serial communication for up to 256 channels per serial port, the 6B Series modules and boards are a complete, low-cost interface between computers and analog signals.

All 6B Series input/output modules are fully encapsulated and identical in pin-out and size, facilitating their ability to be mixed and matched with all other 6B Series modules on the same backplane. The 6B Series is fully rated over the industrial temperature range of -25°C to +85°C.

Each 6B Series module and board is a complete microcontroller-based process monitoring and control system, with all calibration, address and linearizing parameters stored in non-volatile memory. Being microcontroller-based, 6b Series modules can be configured for various sensor types, including

RTD and thermocouple, and a wide variety of input ranges. This reduces the number of different modules that need to be used in a given application and carried in inventory.

FUNCTIONAL BLOCK DIAGRAM

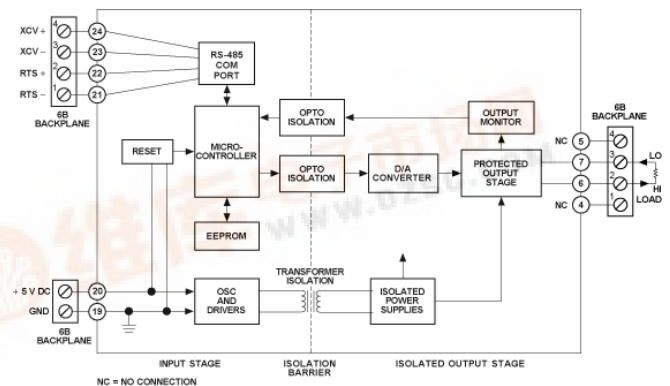


Figure 1. 6B21 Functional Block Diagram

Designed for industrial applications, the 6B Series modules incorporate transformer-based isolation with surface-mount manufacturing technology – providing increased reliability at low cost. The compact, rugged 6B Series analog modules can be mixed and matched on a 16-channel backplane for high density, remote process monitoring and control.

Communications between backplanes, modules and host is in ASCII over an RS-232C link or RS-485 bi-directional serial bus. Circuitry to convert RS-232C to RS485 is built into the 6B backplane. Baud rates are software programmable, with speeds up to 19.2 K Baud.

The 6B Series digital subsystem communication is compatible with the overall 6B Series communication protocol. Each digital I/O board can be configured for its address, baud rate and checksum status. Connection to the 16 and 24-channel solid state relay backplanes is by a 50-conductor ribbon cable. This enables interfacing with input and outputs from 4 V to 240 V. Power control modules are also available that can switch up to 3A and come with a variety of ratings for low voltage DC up to 280 VAC.



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GENERAL DESCRIPTION

The 6B21 is a single-channel signal-conditioning module which provides a digitally-controlled isolated current loop output to a resolution of 12 bits. The output range can be selected to either a 0 to 20 mA or 4 mA to 20 mA process current. It is electrically and mechanically compatible with the 6B Series input modules and backplanes. The 6B21 takes a command from the host computer and converts it into an isolated process current suitable for interfacing with valves and actuators. The 6B21 offers a normal mode output protection of 240 V rms as well as 1500 V rms CMV isolation. In addition the actual current flowing in the current loop is read back by an on-board isolated V/F (voltage-to-frequency) converter.

The 6B21 can be software-configured for address, output range, baud rate, data format, checksum status, slew rate, and start-up value. All programmable parameters are stored in the nonvolatile memory of the module.

An on-board microcontroller communicates with the host

through an RS-485 port to exchange command and status information. An included EEPROM stores calibration constants as well as configuration information. The microcontroller also controls the output DAC through an optically-isolated serial interface. The D/A converter drives the current loop through a protective V/I (voltage-to-current) converter. The output monitor is a V/F converter whose frequency is proportional to the loop current. This variable signal frequency is fed back to the microcontroller through an optical isolator. The microcontroller then scales the frequency signal and returns the current read-back data to the host computer. A DC/DC converter generates 25 VDC from the +5 VDC power supply to power the current loop and output circuitry.



Figure 2

Model 6B21

Range Description (Software Configurable)	Accuracy (Typical)	Accuracy (Maximum)
0 mA to 20 mA	±0.02 % FSR	±0.05 % FSR
4 mA to 20 mA	±0.02 % FSR	±0.05 %FSR

6B21 Specifications

(typical @ +25°C and Vs = +5 V dc)

Description	Model 6B21
Output, Software Selectable	
Current, Operating Ranges	0 mA to 20 mA or 4 mA to 20 mA
Current, Over-range	+2 mA ±200 µA
Load Resistance	0 to 750 Ω
Communications	
Protocol	RS-485
Baud Rates, Software selectable	300K, 600K, 1.2K, 2.4K, 9.6K, 19.2K
Output Current	
Initial Accuracy	
Output Offset	±5 µA (±15 µA maximum)
Span	±0.02% Full Scale Range (±0.05%, max.)
Accuracy vs. Temperature	
Output Offset Current	±1 µA°C
Gain	±50 ppm/°C
Resolution	±0.02% Full Scale Range
Nonlinearity	±0.02% Full Scale Range
Output Noise, 0.1 Hz to 100 Hz Bandwidth	1 µA peak-to-peak
Bandwidth, -3 dB	3 Hz
Conversion Rate	100 samples/second
Setting Time	1 ms to ±0.1% Full Scale Range
Output Slew Rate	
Software Selectable (11 Binary Ranges)	0.125 mA/sec to 128 mA/sec
Common-Mode Voltage (CMV)	
Output-to-Input and Power	1500 V rms continuous
Common Mode Rejection (CMR)	
Output-to-Input and Power @60 Hz	108 dB
Output Protection	240 V rms, continuous
Output Transient Protection	ANSI/IEEE C37.90.1-1989

Output Readback

Initial Accuracy @ +25°C

Output Offset Current	±100 µA
Span	±0.5% Full Scale Range

Accuracy vs Temperature

Output Offset Current	±5 µA/°C
Gain	±200 ppm/°C
Resolution	±0.5% Full Scale Range
Nonlinearity	±0.5% Full Scale Range

Power Supply

Voltage, Operating	+5 V dc ±5%
Voltage, maximum safe limit	+6.5 V dc
Current	+250 mA
Mechanical Dimensions	2.3" x 3.1" x 0.79" (58.4 mm x 78.7 mm x 19.1 mm)

Environmental

Temperature Range	
Rated Performance	-25°C to +85°C
Operating	-25°C to +85°C
Storage	-40°C to +85°C
Relative Humidity	0 to 95% @ +60°C, non-condensing

Specifications subject to change without notice.

PIN CONFIGURATIONS AND FUNCTIONAL DESCRIPTIONS

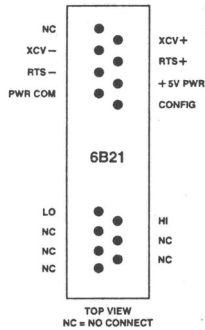


Figure 3 . Model 6B Series Module, with pin-out assignments.

Table 1. Pin Function Descriptions—

Pin No.	Description
1	N/C
2	HI
3	LO
4	N/C

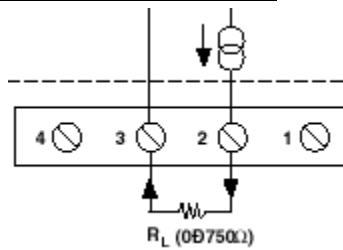


Figure 4 6B21 Input Field Connections

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.



OUTLINE DIMENSIONS

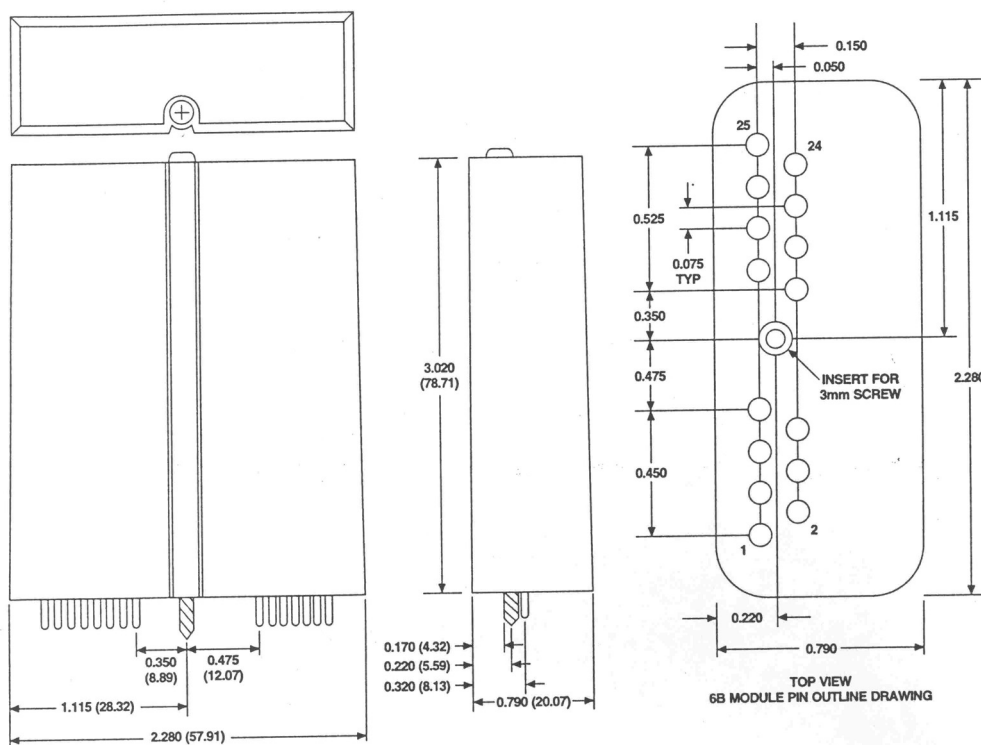


Figure 5. Outline Dimensions

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